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IS : 12448 (Part 1) - 1988

(Reaffirmed 2002)

Indian Standard

BASIC TESTING PROCEDURES AND MEASURING METHODS FOR ELECTROMECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT

PART 1 GENERAL

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1989

Indian Standard

BASIC TESTING PROCEDURES AND MEASURING METHODS FOR ELECTROMECHANICAL COMPONENTS FOR ELECTRONIC EQUIPMENT

PART 1 GENERAL

0. FOREWORD

0.1 This Indian Standard (Part 1) was adopted by the Bureau of Indian Standards on 22 July 1988, after the draft finalized by the Electromechanical Components for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

0.2 This standard contains fundamental information on test methods and procedures for electromechanical components for electronic equipment. It is intended to be used in those cases where a generic or detail specification for a certain component has been prepared so as to achieve uniformity and reproducibility in the testing procedures.

0.3 The term 'environmental conditioning' or 'environmental testing' covers the natural and artificial environmental (including electrical stress) to which components may be exposed so that an assessment of their performance can be made under conditions of use, transport and storage to which they may be exposed in practice.

0.4 The requirements for the performance of the components are not covered by this standard. The relevant specification for the item under test defines the permissible performance limits.

0.5 It is proposed to cover various tests for electromechanical components for electronic equipment in this series of standards. A list of the tests currently envisaged in this series and their arrangement is given in Appendix A. Appendix A will be updated whenever needed.

0.6 This standard is based, without any technical change, on IEC Pub 512-1 (1984) 'Electromechanical components for electronic equipment: Basic testing procedures and measuring methods — Part I: General', issued by the International Electrotechnical Commission (IEC).

0.7 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part 1) is intended to be used as a basic specification. It contains basic test methods and procedures applicable to electromechanical components, with the following families or sub-families:

a) Connections, solderless;
b) Connectors for frequencies below 3 MHz;
c) Sockets for electronic tubes;
d) Sockets for other plug-in-devices;
e) Switches, lever;
f) Switches, push-button;
g) Switches, rotary;
h) Switches, sensitive;
j) Switches, thermal time-delay; and
k) Switches, thermostatic.

1.2 Other electromechanical devices that are not specifically covered by this standard include:

a) capacitors, variable;
b) connectors for frequencies above 3 MHz;
c) inductors, variable;
d) resistors, variable;
e) solenoids;
f) switches, magnetically operated; and
g) switches, proximity.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Family — A group of electromechanical components which predominantly display a particular physical characteristic and/or fulfil a specific function.

2.2 Sub-Family — A group of electromechanical components derived by further sub-division of a family and having similar application features.

2.3 Type and Style — For the definitions of 'type' and 'style', referring to a particular component, *see* relevant specification.

2.4 Examples

Family	: Connector
Sub-family	: Rack and panel connectors
Type	: Rectangular multiple connectors with blade contacts
Style	: Rectangular multipole connectors with blade contacts, housing and contact configuration.

2.5 Basic Specification — A specification which is applicable to all electromechanical components or a large group thereof.

2.6 Generic Specification — A specification which is applicable to a sub-family and which may contain rules for the preparation of detail specifications.

2.7 Detail Specification — A specification which is derived from a generic specification. It covers a particular component or a group of related components. It describes that component or group of components, including all necessary values and characteristics, and gives the inspection requirements and appropriate references to the generic specification.

2.8 Inspection (Test) Lot — A specified quantity of identical electromechanical components presented together for testing in accordance with the relevant test schedule.

2.9 Test Specimen — A single electromechanical component to be tested in accordance with the procedure laid down in this standard.

2.10 Test — The complete series of operations covered by any one heading and normally consisting of the following:

a) preconditioning (where required);
b) initial measurement (where required);
c) conditioning;
d) recovery (where required); and
e) final examination and measurements.

2.11 Preconditioning — Treatment of a specimen for the purpose of removing or partly counteracting the effects of its previous history.

2.12 Conditioning — The exposure of a specimen to environmental conditions including elecrical load in order to determine the effect of such conditions on it.

2.13 Recovery — Treatment of a specimen after conditioning in order to stabilize its properties before measurement.

3. GENERAL

3.1 The object of this standard is to establish test methods and measurement procedures for use in specifications for the components listed.

This standard shall be used in conjunction with IS : 9000 (Part 1)-1988*.

This standard shall be used in conjunction with the generic and/or detail specification which will select and prescribe the tests to be used, the required degrees of severity for each of them and the permissible performance limits. The detail specification will also specify the deviations in procedure, which may be inevitable when applying a test to the type of component under consideration, and it will further specify the special procedures which may be required.

In the event of conflict between this basic specification and any individual component specification, the requirements of the component specification shall apply.

4. STANDARD CONDITIONS FOR TESTING

4.1 Unless otherwise specified, all tests shall be carried out under standard atmospheric condi. tions for testing as specified in IS : 9000 (Part 1)-1988*.

Before measurements are made, the test specimens shall be preconditioned under standard atmospheric conditions for testing for a time as specified in the detail specification.

The ambient temperature and relative humidity at which the measurements are made shall be stated in the test report.

The test shall be carried out with specimens as received from the supplier. In no case shall the contact parts be cleaned or otherwise prepared prior to test, unless explicitly required.

In cases of dispute about the test results, the test shall be carried out at one of the referee conditions of IS : 9000 (Part 1)-1988*.

5. TESTING

5.1 Test Sequences — The test sequences are as described in the generic or detail specifications. The test numbers used in this standard have no significance with respect to test sequence; they are given to identify a test for reference purposes. In order to avoid duplication and costly measurements, the generic or detail specification will also select and prescribed those measurements to be performed out of a list of measurements contained in the various test method documents.

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*Basic environmental testing procedures for electronic and electrical items: Part 1 General (*first revision*).

5.2 Combined Tests — Combined tests are specified. Additional combination of tests shall be avoided unless essential to a specific application.

5.3 Repetition of Measurements — Repetition of identical dimensional measurements is to be avoided unless required to prove that all aspects of manufacturing, tooling or processes are satisfactory, for example, parts produced from multi-cavity tooling.

6. CLASSIFICATION OF DEFECTS

6.0 A defect is any non-conformance of a component with specified requirements. For the purposes of this standard, the defects of any electromechanical component shall be grouped into the following clauses.

6.1 Major Defects — A major defect is a defect that:

a) is likely to result in premature failure of the component; and/or

b) reduces materially its ability to perform its intended function.

6.2 Minor Defects — A minor defect is a defect that does not reduce materially the ability, of a component to perform its intended function, or is a minor departure from specifications having little or no effect on the ability of a component to perform its intended function, for example, scratches, surface finish, minor corrosion discolouration, etc.

NOTE — A minor defect normally is not a cause for rejection, but shall be recorded in the test report.

APPENDIX A

(*Clause* 0.5)

LIST OF TESTS CURRENTLY ENVISAGED AND THEIR ARRANGEMENT

Test No.	*IS No.*	*Title*
		Basic testing procedures and measuring methods for electromechanical components for electronic component:
	IS : 12448 (Part 1)-19...	Part 1 General
	IS : 12448 (Part 2)-19	Part 2 General examination, electrical continuity and contact resistance tests, insulation tests and voltage stress tests
1a		Section 1 General examination Visual examination
1b		Examination of dimensions and mass
		Section 2 Electrical continuity and contact resistance tests
2a		Contact resistance — Millivolt level method
2b		Contact resistance — Specified test current method
2c		Contact resistance variation
2e		Contact disturbance
2f		Housing (shell) electrical continuity
2h		Resistance (earthing) from actuator to mounting bushing (surface)
		Section 3 Insulation tests
3a		Insulation resistance
		Section 4 Voltage stress tests
4a		Voltage proof
4b		Partial discharge
4c		Voltage proof of pre-insulated crimp barrel
	IS : 12448 (Part 3)-19...	Part 3 Current carrying capacity tests
5a		Temperature rise
5b		Current/temperature derating
	IS : 12448 (Part 4)-19...	Part 4 Dynamic stress tests
6a		Acceleration, steady state

Test No.	*IS No.*	*Title*
6b		Bump
6c		Shock
6d		Vibration
	IS : 12448 (Part 5)-19...	Part 5 Impact tests (free components), static load tests (fixed components), endurance tests and overload tests, Section 1 Impact tests (free components)
7a		Free fall (repeated)
7b		Mechanical strength impact
		Section 2 Load tests (fixed components)
8a		Static load, transverse
8b		Static load, axial
8c		Robustness of actuating lever
		Section 3 Endurance tests
9a		Mechanical operation
9b		Electrical load and temperature
9c		Mechanical operation with electrical load
9d		Durability of contact retention system and seals (maintenance, ageing)
		Section 4 Overload tests
10a		Electrical overload (switches)
10c		Switching capacitive loads
	IS : 12448 (Part 6)-19...	Part 6 Climatic tests and soldering tests, Section 1 Climatic tests
11a		Climatic sequence
11b		Combined/sequential cold, low air pressure and damp heat
11c		Damp heat, steady state
11d		Rapid change of temperature
11e		Mould growth
11f		Corrosion, salt mist
11i		Dry heat
11j		Cold
11k		Low air pressure
11m		Damp heat, cyclic
11n		Gas tightness, solderless wrapped connections
		Section 2 Soldering tests
12a		Solderability, wetting, solder bath methods
12b		Solderability, wetting, soldering iron method
12c		Solderability, dewetting
12d		Resistance to soldering heat, solder bath method
12e		Resistance to soldering heat, iron method
	IS : 12448 (Part 7)-19...	Part 7 Mechanical operating tests and sealing tests
		Section 1 Mechanical operating tests
13a		Engaging and separating forces
13b		Insertion and withdrawal forces
13c		Operating force (switches)
13d		Operating torque (switches)
13e		Polarizing method
		Section 2 Sealing tests

Test No.	*IS No.*	*Title*
14b		Sealing (fine air leakage)
14d		Immersion, water proof
14e		Immersion at low air pressure
	IS : 12448 (Part 8)-19...	Part 8 Connector test (mechanical) and mechanical tests on contacts and terminations
		Section 1 Connector tests (mechanical)
15a		Contact retention in insert
15b		Insert retention in housing (axial)
15c		Insert retention in housing (torsional)
15d		Contact insertion, release and extraction force
15e		Contact retention in insert, cable nutation
15f		Effectiveness of connector coupling devices
		Section 2 Mechanical tests on contacts and terminations
16a		Probe damage
16b		Restricted entry
16c		Contact bending strength
16d		Tensile strength (crimped connection)
16e		Gauge retention force (resilient contacts)
16f		Robustness of terminations
16g		Measurement of contact deformation after crimping
16h		Insulation grip effectiveness (crimped connections)
16i		Grounding contact spring holding force
16k		Stripping force, solderless wrapped connections
16m		Unwrapping, solderless wrapped connections
16n		Binding strength, fixed male tabs
16p		Torsional strength, fixed male tabs
16q		Tensile and compressive strength, fixed male tabs
	IS : 12448 (Part 9)-19...	Part 9 Cable clamping tests, explosion hazard tests, chemical tests, fire hazard tests, rf resistance tests, capacitance tests, shielding and filtering tests and magnetic interference tests
		Section 1 Cable clamping tests
17a		Cable-clamp robustness
17b		Cable-clamp resistance to cable rotation
17c		Cable-clamp resistance to cable pull (tensile)
17d		Cable-clamp resistance to cable torsion
		Section 3 Chemical resistance test
19a		Fluid resistance of pre-insulated crimp barrels
		Section 4 Fire hazard tests
20a		Flammability needle flame
		Section 5 R F resistance tests
21a		RF shunt resistance
		Section 6 Capacitance tests
22a		Capacitance
		Section 7 Shielding and filtering tests
23b		Insertion loss of integral filters
		Section 8 Magnetic interference tests
24a		Residual magnetism

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